GLAST USERS COMMITTEE MEETING (GUC)

August 9-10, 2004
Goddard Space Flight Center, Bldg 16W, Room N76

Present:

Committee members:
Josh Grindlay (Chair), Dave Bertsch, Roger Brissenden, Jim Buckley, Wim Hermsen, Jim Ling, Alan Marscher, Reshmi Mukherjee, Rene Ong, Rita Sambruna, Greg Stacy, Marc Strickman, Ann Wehrle
Ex Officio Committee members:
David Band, Don Kniffen, Chip Meegan, Peter Michelson, Jay Norris (by telephone), Steve Ritz
GSSC staff and colleagues:
Jim Chiang, Robin Corbet, Masa Hirayama, James Peachey, Julie McEnery, Tom Stephens, Dave Thompson, Kathy Turner

Note: presentations posted on website marked as "posted talk"

August 9, 2004

Introduction:

Josh opened the meeting and thanked all for attending. Introductions were made.
Minutes (terse) will be kept by David Band, and reviewed/edited by Josh Grindlay
Action items will be assigned.
No GUC Charter exists yet since Don Kniffen was waiting for Josh to take over as chair

Mission update:

Don (NASA HQ Report)—Dan Blackburn is the new Program Executive (a role once called Program Manager); GLAST is his only responsibility. Given the recent NASA reorganization, little progress has been made in filling positions, e.g., Paul Hertz's (Paul was moved to a position in the 'front office,' which subsequently went away!).

GLAST's budget and schedule are being watched carefully. But external factors may have a big effect. For example, STIS on HST just died, which may increase the pressure for HST servicing. The expense for the servicing mission is not budgeted, and will probably have to come out of other space science missions. Other space science missions are off-limits, which may put additional budget pressure on GLAST.

GSFC did not compensate GLAST sufficiently in '04 and '05 for the effects of full cost accounting.

Kathy Turner (DOE Report), posted talk—DOE is happy with GLAST, but is concerned about budget and schedule. DOE participation in GLAST has 2 parts: construction ($42M) and operations, which includes I&T. The operations budget from DOE is ~$7M/yr; the operations

budget is fairly flexible. The total US construction budget is $138M until I&T, most of which is already spent. In the operations phase NASA's spending will be ~$7M for the GI program.

Steve Ritz (Mission Report), posted talk—The relationship between the Science Working Group (SWG) and the GUC was discussed. As for other missions, the SWG may be phased out at launch, with some of its members merged into GUC.

NASA's confirmation review of GLAST was in December, which allows the mission to go forward. NASA is committed to a launch on 2/28/07. The confirmation review was before NASA's new vision was announced, and GLAST has been untouched by the vision thus far.

Data Challenge 1 (DC1) was a success. Steve emphasized that DC1 was 'messy,' as was planned! Roger Brissenden suggested the DCs should eventually include the HEASARC server in the system. He also asked about the relation of the DCs to formal software testing and whether there are official software releases. Answer: the software must have specified capabilities by the DCs, and the DCs show that the analysis system has the desired capabilities.

Ann Wehrle asked whether DCs are linked to software Pipeline releases. For example, will DC3 be Pipeline release 0.8?

DC2, currently planned for July, 2005, will be more realistic background simulation and also include source variability.

Discussion followed about how the GUC should play a role in evaluating future DC2 and DC3.

Recent and upcoming reviews:
- May—S/C CDR
- June—GBM CDR
- August—Ground System Design Review
- September—Mission CDR

Peter Michelson (LAT Report), posted talk—The schedule is challenging, but it is more important to get it right. The first TKR tower will be done in September, and the first CAL module soon afterwards. The pre-ship review is12/1/05, allowing 4 weeks of float.

- Subsystem status:
  TKR: The SSDs are completed (with a very low reject fraction), the ladders are half done, but less than 1% of the trays are completed.
- CAL: Doing well, but capacitors needed to be replaced, resulting in a hit to the schedule.
- GRID: Machined.
- DAQ: A test bed has been created.
- ISOC: Rob Cameron will be manager. A working group chaired by Seth Digel and Isabelle Grenier will design the Level 3 products (e.g., catalogs). The LAT will monitor sources and post their fluxes for duration of the mission. The list for sources that will be monitored will start at ~10-20, but will grow.

Chip Meegan (GBM Report), posted talk—GBM has a 60 day float. RFAs issued at reviews have added unanticipated expenses.

The final (of 4) CDRs was successfully passed in June. Detector development has been delayed by procurement problems and funding difficulties at MPE.

A silicon pad behind the NaI window will hurt the low energy performance; this was a result of miscommunication between people in different countries. The GBM will not meet the 5 keV sensitivity goal, and will have 25% transmission at 10 keV. Thus the GBM will miss the Level 3 requirement specifying the effective area at 14 keV (although the 14 keV effective area is projected to be 75cm^2 instead of ~100cm^2). Since these are flight detectors, there is no remedy. This assessment of the decrease in capabilities is based on calculations, not hardware tests. First tests of GBM LE performance are expected in September.

Use of the GBM as an all-sky monitor is not funded. Developing this capability could be done as a GI project. It would be good to have this capability at launch, but this would require starting the GI funding before launch.

Jim Ling (GBM as sky monitor)—The GBM's sensitivity will be ~3X below that of BATSE at energies above 25 keV, and thus the GBM will do less at high energy. But at low energy (10-25 keV) the GBM was projected to do better, though this must now also be questioned in view of the reduced GBM sensitivity below ~15 keV. The MSFC and JPL groups both have software from BATSE that might carry over to the GBM. The JPL group modeled the background, while the MSFC group's approach was more empirical and faster.

Mark Strickman pointed out the backround for the GBM, as a (primarily) zenith pointed instrument, will be different from BATSE.

The use of the GBM for source monitoring will not change the data sent down. This monitoring will provide context for LAT observation, and will probably not trigger LAT observations. It probably will be useful only for relatively bright galactic sources (e.g., X-ray novae) but not be useful for AGN. The MSFC group (i.e., the GBM instrument team and colleagues in Huntsville) probably can be ready earlier with less effort.

Josh suggested that the GBM team provide 1) an updated (for likely GBM sensitivity at low energy) estimate of the GBM vs. BATSE sensitivity for source monitoring and 2) a rough estimate of cost to implement BATSE-based software to enable source monitoring.

GSSC Report:

Jay Norris (Status), posted talk—There were many questions about the management and responsibility for developing the Standard Analysis Environment (SAE):

Jim Ling asked how data analysis software is shared between the GSSC and SLAC?
Roger Brissenden asked who has final control over S/W development and specifications?

Jay responded that frequent meetings ensure coordination. There is a 7 member GSSC-LAT working group to coordinate issues. Seth Digel is the manager of SAE development. Jay will provide a chart to make the boundaries clearer.

David Band (User Support), posted talk—Various suggestions from the Committee were made in the course of the talk:

- The Committee members strongly advocated including many examples and analysis 'recipes' in the software documentation.
- When the GSSC sends a TOO order to the MOC, it should also send out e-mail to interested scientists in addition to posting information about the TOO on its website. An RPS form similar to that used by RXTE should be used to enter TOO's.
- Joint GLAST-other mission proposals should be considered.
- The Committee recommended there should be a Science Policy document beyond the PDMP.

Data Policy:

Steve Ritz, posted talk—Steve proposed a *revised data policy for the first year*: The GIs in Cycle 1 will not have access to LAT photon data; this will reduce the LAT team's work while it calibrates the instrument. In return, the LAT team will release more processed data such as information about transients (when, where, how bright) and lightcurves in different energy bands for ~20 sources that the LAT team will monitor. Peter Michelson will propose precisely which data will be released. The monitoring of bright and interesting sources by the LAT team could continue in Phase 2.

The GUC will be involved in choosing the list of sources that will be monitored. Consequently multiwavelength correlations might be the main Cycle 1 project.

GIs would be selected in Cycle 1 to work on these ~20 sources being monitored. Data (processed) on these sources are released to full community.

To prepare the user community to analyze data during Cycle 2, the GSSC will provide simulated data to play with the SAE during Cycle 1. In addition, transients need to be defined. There was general GUC approval of Steve's Year 1 policy.

Users should not be required to agree to an Honor Statement, but a statement on the GSSC website would state that users should respect the accepted proposals. Some questioned whether the abstracts of accepted proposals should be posted, thereby letting successful GIs get 'scooped; however, posting these abstracts is probably a legal requirement.

Regarding the size of funding grants, NASA HQ advocates a minimum of $50K and prefers at least $75K.

Steve advocated a GLAST Fellows program with 3 Fellows chosen every year for 3 years of funding. GUC members pointed out that universities do NOT waive the overhead on Fellows program grants.

The GUC was supportive of a GLAST Fellows program even if it meant fewer funds available for GI investigations.

Data Analysis Software:

David Band (Overview), posted talk.

Jim Chiang (Likelihood), posted talk—The major issue is the running time for analyses with many photons. Whereas EGRET used binned likelihood, LAT will use unbinned likelihood. Will likelihood be useful mostly for short observations? Analyses may require two steps: other tools will find sources, and likelihood will refine the positions and fit spectra. Prototype system has been developed: ~2000 events in 30º FoV takes ~1min on a PC to process.

David Band (GRBs), posted talk—Likelihood code (based on LAT) could be used for GRBs with small numbers of photons. GRB detection software NOT being provided to user community; rather, will rely on GBM or LAT trigger.

Masa Hirayama (Pulsars), posted talk—The tools being developed do not (yet) allow for incorporating binary pulsar ephemeris information. Jim Buckley pointed out that observing modes (e.g., scanning vs. pointing) might be tailored to optimize window functions and deal with sidebands.

James Peachey (SAE Implementation), posted talk—Roger Brissenden asked about SAE requirements. Answer: they are posted.

Jim Ling asked about the GUC beta testing the SAE, and James suggested that this could occur after DC2. Jim Ling asked about the tools' configuration management. James answered that this depended on the stage of software development.

Marc Strickman asked whether cygwin was required to run the FTOOLS on Windows. James answered that the old tools that include Fortran require cygwin. The new HEADas will have native Windows support. In many cases the GLAST tools might become the Windows version for a given capability.

Steve Ritz asked when tools can be reviewedby the GUC. Starting with the next meeting, one analysis thread will be demonstrated at each GUC meeting.

Observing Plans:

Pointing vs. Survey Mode time allocation:
First, currently no Project Scientist discretionary time is set aside. Presumably such time would be used for pointed observations. Second, Steve Ritz is concerned that a minority of GIs requesting pointed observations may hurt the science of a silent majority of investigators who want survey mode, but don't propose survey mode observations because it is the default. Setting a maximum fraction of pointed observations may therefore be wise. Steve proposed that in Phase 2 (the GI cycles after Cycle 1) 80% of the observing time be dedicated to survey mode and GI-proposed pointed observations, and 20% to Project Scientist discretionary time and instrument calibrations. The Project Scientist discretionary time might be spent adding to a GI's pointed observation. LAT calibrations may not require many special observing modes; for example, alignments can rely on survey mode observations. Special modes might reject fewer cosmic rays onboard. Therefore, only ~5% calibration time may be needed.

Rene Ong pointed out that Project Scientist discretionary time provides flexibility to respond to scientific and mission needs, and Roger Brissenden said that Chandra's discretionary time is 5%. Don Kniffen stated that the Project Scientist will have guidance as to the use of discretionary time. Peter Michelson suggested that discretionary time would be useful for testing new observing modes. Josh Grindlay summarized the consensus that ~10% discretionary time is a good idea, and that TOOs not proposed by GIs should come out of this allotment.

The pressing issue is the breakdown of the 80%. Roger Brissenden pointed out that the cost for one mode vs. another needs to be considered, and that this cost includes the effort for scheduling observations. Steve Ritz said that we need *figures-of-merit* to help decide between observing modes, and to decide whether to perform a TOO. For example, a multiwavelength campaign may be messed up by a TOO. We need a mechanism indicating that the default survey mode should be maintained because of a multiwavelength campaign or the window function for a temporal study. A figure-of-merit that would allow weighting by effective area and angular resolution per unit solid angle should be derived.

Josh Grindlay asked whether a deep survey would be useful. Rita Sambruna stated that we need a study to show the relative merits of different observing modes.

It was noted that no current pointing scheduling software (e.g., Tako, developed for Astro-E and planned to be used for Swift) deals with the very large FoV issues that GLAST presents.

Finally, Jim Buckley asked whether CAL-only events or ACD-observation modes would be useful. Steve Ritz stated they would not, and were not planned.

Committee Discussion At End of 8/9/04

Josh—Issues that could become Action Items:

- Merits of survey vs. pointing mode, using which figures-of-merit?
- Project Scientist discretionary time and its uses: tentative decision that 10% is appropriate
- Advance GI funding (e.g., for a GBM monitoring program)? Decision not to pursue as an action item
- Definition of data products released in first year
- How SAE is integrated, LAT-GSSC interface, pipeline vs. SAE
- GUC Charter
- Next meeting in 1/2 year? If less frequently, telecons?
- Joint SWG-GUC meeting?
- Include GUC in DC2? Might intimidate.
- SAE walk-throughs, beta testing
- Remove honor statement.
- GUC report to HQ, letter to Don?
- Merge the SWG into the GUC after launch? However, the SWG members might dominate the GUC, as happened with CGRO.
- Size of the GI program awards. $6-8M/yr is currently planned. *Steve needs support in writing a justification.*
- Get size of CGRO GI program from Chris Shrader.
- Get comments to David Band and Steve Ritz on PDMP by Sept. 10.

August 11, 2004

PDMP:

David Band, posted overview talk—The GUC decided that the science policy statements (data access, transients, frequency of TOOs and autonomous repoints) should be pulled out of the PDMP and kept in a separate document, if consistent with NASA policy. The website and NRAs can then refer to the policy document.

The GUC felt that the PDMP includes insufficient information about instrument calibration, even if the data products are archived internally by the instrument teams. Although data archiving is described, it is not emphasized sufficiently. The contents of the burst alert telemetry should be included as a table in §5. The section (§6) summarizing the responsibilities of each ground element repeats much of the content in earlier sections, and should be eliminated (after ensuring that no content is lost).

The GUC decided that there should not be a Timeline Committee that would have meet once a year after the peer review panels had provisionally selected GI observations, but that instead an operations working group with expertise from the instrument teams should work on technical issues such as technical implementation (but not policy).

It was agreed the PDMP should include a mission description. There was considerable discussion about the PDMP vs. a Data Policy or Science Policy document. Roger Brissenden noted that for AXAF the PDMP was indeed a plan (1 year before launch) but that data policy has evolved with the mission . The PDMP is more of a "data-centric" plan to ensure the Project has well defined data flow and dissemination plans.

It was agreed that the PDMP should be revised, although major changes can be incorporated later if needed. In contrast, a Science Policy document should be more evolutionary.

Multiwavelength Observations:

Steve Ritz (Multiwavelength)—The mission and the LAT team have separate multiwavelength plans. Dave Thompson has set up a mission website supporting multiwavelength efforts. Steve asked if the GUC supported setting up a Mission Multiwavelength Working Group? Although there are Interdisciplinary Scientists to support multiwavelength programs, there is no formal WG.

Dave Thompson (Multiwavelength), posted talk—A LAT WG (Roger Blandford and Dave Thompson, co-chairs; Seth Digel, Greg Madejski, Roger Romani and Steve Thorsett) has considered the tasks needed to support multiwavelength observations before and during the mission. Before the mission we need new blazar catalogs and a prioritized list of pulsars to be monitored. During the mission the identification of new gamma-ray sources should start from the X-ray. Major problems are that by GLAST's launch the Spitzer's cryogen will be consumed, creating an FIR gap in the multiwavelength coverage, and insufficient X-ray monitoring capability will exist during the GLAST mission since the RXTE/ASM will likely no longer be operational and future ASMs are not certain (e.g., the status/schedule of MAXI on the ISS?).

Issues to be considered are: maintaining the LAT's multiwavelength efforts into Phase 2; balancing multiwavelength discovery (identifying gamma-ray sources) vs. exploration (studying identified sources); balancing GI and LAT team interests; and incorporating observers involved in multiwavelength into the LAT team. The discovery vs. exploration issue is significant: the effort taken for identification and followup of individual blazars discovered with EGRET (e.g., J2006-2321) cannot be done realistically for the projected 3000 that might be discovered with GLAST.

Discussion focused on using the first year GI program to support projects crucial to the success of the mission, especially multiwavelength and source monitoring research. Rita Sambruna noted that key questions should be science driven. This will be called the 'legacy' program. While the community will propose the projects, we want to make sure all necessary programs are done, and therefore may need to recruit if necessary. These would be multiyear (3 year?) grants. It was suggested that pre-launch funding might be possible using the contingency budget, although it seems doubtful this would be allowed (to use contingency). Should there be key projects in addition to the legacy projects?

The GUC agreed that a significant component of any legacy program should be multiwavelength monitoring campaigns and the long term preparations needed to carry them out. Consequently, the ~20 monitored LAT sources should be announced in advance. A remaining question is whether the supported OIR observations should be proprietary to the observers.

Miscellaneous Issues:

Greg Stacy asked whether solar flares can trigger autonomous repoints. Steve Ritz sees no reason why not. Note that the sun will be observed in survey mode and there is no instrumental or spacecraft restriction against pointed observations. The GBM flight software will distinguish between transients likely to be bursts and those likely to be solar flares, and therefore autonomous repoints for solar flares will have to be enabled. Intense solar flares can flood the ACD and saturate the LAT. Turning off the ACD veto and using the inner 4 towers during solar flares has been thought about but not implemented.

Greg Stacy also asked about the role of the GSSC 'ambassadors' to instrument teams in supporting GIs. This has not been worked out, and needs to be discussed with Jay Norris. Clearly they will be conduits of information about the instruments back to the GSSC.

The LAT team is planning to provide space for GIs to visit the ISOC. The GSSC is not planning to provide facilities for GIs to receive onsite assistance in analyzing their data, although scientists will not be barred from visiting.

The GSSC plans to run workshops on analyzing the GLAST data (e.g., similar to the Chandra CIAO workshops, which have been very successful) and to provide assistance electronically, e.g., through a help desk. Roger Brissenden stated that although Chandra planned a small amount of space for visitors there was little or no demand since users' needs were met through the web and other user support interfaces provided by the CXC.

Suggestions for Roles for the GUC

The Committee then discussed various roles for the GUC which may be incorporated into the Charter. Roles for the GUC, and those suggesting them, were:

- Advisory committee on GSSC's functioning—Josh Grindlay
- Review NRA—Peter Michelson
- Relationship to other missions—Steve Ritz
- Sponsor GLAST symposia—Steve Ritz
- Review SAE—Peter Michelson
- Advocate continuing support—Dave Bertsch
- Chair should attend SWG—Steve Ritz
- Involvement in SWG-LAT symposia—Steve Ritz
- Balance of resources between GI and GSSC—Roger Brissenden
- Outreach—Josh Grindlay
- Membership: NASA terms are usually 3 years, but because the terms should be staggered, the terms for some of the initial set of members may be more than 3 years.

Next Meeting

The next GUC meeting will be at Stanford, tentatively on March 3-4, 2005. Seth Digel will be asked to make a presentation on the diffuse gamma-ray background.

Formal Action Items:

The GUC concluded the meeting by reviewing and assigning Action Items and due dates, which allow for incorporation of these into the next meeting of GUC in March, 2005.

1. Determine the relative merits of pointed vs. survey mode. This will require developing different figures of merit and performing trade studies. Assigned to David Band, Jim Buckley, Julie McEnery, Peter Michelson, and Reshmi Mukherjee, with Julie coordinating the effort. Due date: Feb. 15
2. Define the policy for Project Scientist Discretionary Time. Assigned to Steve Ritz and Rene Ong. Due date: Feb. 15
3. Determine the GBM's sensitivity as a sky monitor and the effort necessary to apply BATSE software to the GBM. Assigned to Chip Meegan and Jim Ling. Due date: Feb. 15
4. Summarize a) the division of responsibility between the GSSC and the LAT team for the SAE, b) the development plan, and c) the software updating plan. Assigned to Peter Michelson and Jay Norris. Due date: March 3
5. Develop the GUC Charter. Assigned to Josh Grindlay and Don Kniffen. Due date: Sept. 11.
6. Develop the plans for the Cycle 1 GI program, particularly the LAT data release in the first year. Assigned to Peter Michelson. Due date: Feb. 15
7. Develop the Science Policy document. Assigned to Roger Brissenden and Steve Ritz. Due date: Feb. 15
8. Organize a demonstration of an analysis thread using the SAE. Assigned to Jay Norris. Due date: March 3
9. Determine the size of the GI programs and DOE's support plans. Assigned to Josh Grindlay, Steve Ritz, and Peter Michelson. Due date: Feb. 15

10. Send comments on the PDMP to David Band and Steve Ritz. Assigned to GUC. Also, determine NASA HQ's PDMP policies. Assigned to Don Kniffen. Due date: Sept. 11.
11. Develop the policy for legacy proposals. Assigned to Josh Grindlay and Rita Sambruna. Due date: Feb. 15

Recommendations:

1. There should be 2 GUC meetings per year
2. The data access policy should not include an honor statement that investigators should respect the accepted GI proposals.
3. The GUC supports having a GLAST Fellows program.